EXPRESS MAIL NO. EL625499950US

APPLICATION FOR UNITED STATES LETTERS PATENT

SPECIFICATION

(Case No. MBHB00-591)

TO ALL WHOM IT MAY CONCERN

Be it known that Edward M. Housel, a citizen of the United States and a resident of Rochester, New York has invented certain new and useful improvements in a

METHOD OF GENERATING PRINTER SETUP INSTRUCTIONS

of which the following is a specification.

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BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of generating printer setup instructions and controlling a printer having attached finishing devices. More particularly, this invention relates to a method of generating a printed instruction sheet listing the setup instructions for finishing devices attached to the printer, allowing the setup operator to carry the printed instruction sheet to the user interface on the finishing device to input the setup instructions, without having to input the instructions from memory. Additionally, the method provides for coordination of the setup instructions with a particular print job by automatically placing all print jobs in a hold state until the operator releases the print job.

2. Brief Description of the Related Art

High-speed printers and copiers are often connected to so-called "finishing devices," such as a perfect binding machine, three-hole punch and the like. Each of the finishing devices connected to the printer must be setup for a particular print job. For example, a hole punch may have mechanical detents that must be set to a predetermined configuration for a given print job. These finishing devices are connected to the printer by a simple electrical connection, consisting of a relatively small number of wires. Thus, the electrical connection between the printer and the finishing device may be capable of signaling a paper jam in the finishing device or an out-of-paper condition, but is not capable of transmitting or receiving large amounts of data or more sophisticated messages to or from the printer logic control unit (LCU). Moreover, the finishing device may be made by a third-party manufacturer and, therefore, there may be no means for even rudimentary control of the finishing device through the printer LCU. Because of these limitations, current printer systems do not provide for entry of finishing device setup instructions through the printer user interface.

In the case of a stand-alone network printer, the print jobs are submitted through the network. Alternatively, the print job could be entered through the printer user interface. In any event, when the print job is submitted through the network or printer user interface, the submitter enters certain data, often referred to as job ticket data, that

includes information about certain characteristics of the job, such as paper size, and paper handling and finishing instructions, including setup instructions for the necessary finishing devices to be used in completing the print job. Such setup information is generally entered in an operator message that will be displayed on the printer user interface when the job arrives at the printer.

When a print job is entered through the network interface, the job is placed in a print server queue on the network, until a slot opens in the raster image processor (RIP) queue in the printer system. When the print job is transferred to the RIP queue, it is assigned a print job number and the RIP generates an operator message, if one is associated with the print job. The setup instructions for a given print job are displayed on the printer user interface as an operator message. The operator message informs the operator that a certain print job requires custom finishing device setup, and specifies the particular finishing device setup parameters. However, as discussed above, while the finishing device setup instructions for a particular job are displayed on the printer user interface, it is impossible, given the current state of the art, to enter setup information for finishing devices through the printer user interface. Moreover, typical printer user interfaces allow the display of only a limited amount of information in an operator message, for example sixty-three characters, thereby imposing restrictions on the amount of instructions that may displayed at a given time on the printer user interface. This results in a limited amount of information being provided to the operator, possibly in a cryptic, abbreviated fashion, making it difficult for inexperienced operators to properly setup the machine and making it more likely that even experienced operators will misunderstand the instructions.

Typical arrangements of printer systems often place the finishing devices some twenty to thirty feet from the printer user interface. Thus, the operator is required to read the setup instructions from the printer user interface, quickly memorize the setup instructions for one or more finishing devices, walk to the finishing devices and enter the individual setup instructions for each print job. This limitation introduces the potential for human error, in that the operator must accurately recall and enter the setup instructions for a particular job at a location remote to where the instructions are displayed. At the high print volumes made possible by high-speed, high-capacity printer

systems, human error in the setup of finishing devices can result in expensive wasted print runs, where, for example, the hole punch is setup incorrectly and places the holes in other than the desired locations. Furthermore, it is impossible for the operator to re-check the instructions he or she has entered without repeating the entire process, walking back to the printer user interface, re-reading the instructions, walking back to the finishing device and re-checking the instructions entered. In addition to the potential for human error, this process slows down the preparation and execution of print jobs, thus impairing overall productivity. Therefore, there is a need in the art for an improved method of displaying instructions that would minimize the reliance on operator memory and would minimize the amount of times the operator is required to walk back and forth between the printer user interface and the finishing devices. Additionally, there is a need in the art for an improved method of generating setup instructions that would increase the amount of information available to the operator.

Finally, the operator must perform all of the finishing device setup tasks individually on multiple print jobs that are processed sequentially through the print system at a high rate of speed. The potential therefore exists for a situation in which the operator sets up a given finishing device for particular print job while there are other print jobs in the marking engine queue that may not generate operator messages. The operator may therefore setup finishing devices for the first print job, and a later print job may come through the system before the operator is able to re-set the finishing devices for the later job, thus wasting the materials expended in the later print job.

Accordingly, there exists a need in the art for a method of setting up finishing devices for individual print jobs while preventing later print jobs that may be resident in the marking engine queue from being processed before the operator has re-set the finishing device parameters for the next print job.

SUMMARY OF THE INVENTION

In one embodiment, the invention is a method of performing setup operations on a finishing device connected to an electrophotographic printer, the printer having a printer user interface, in which a print job is entered into the printer, the print job including setup instructions for at least one finishing device written as an operator message. Following entry of such a print job, the printer system automatically prints an instruction sheet

listing setup operations to be performed prior to completing the print job and automatically places on hold all pending print jobs that specify the designated finishing device. Alternatively, the system could place all print jobs on hold, or could place on hold all jobs including operator instructions. The operator then performs the setup operations listed on the printed instruction sheet and, when setup is complete, enters a release code to thereby release the print job from hold and allow the printer to complete the print job.

In another embodiment, the method includes additional steps, wherein the printer accesses a database of setup instructions that are to be performed on the at least one finishing device, retrieves a file from the database containing instructions for a specified finishing device, reads and translates the file into a page description file that is rasterized and incorporated into the printed instruction sheet.

In an additional embodiment, the invention is a method of managing a printer system, including the steps of receiving a print job and determining whether the print job includes operator instructions. If the print job specifies a finishing device, the printer system determines whether the print job includes instructions directing an operator to perform specific setup operations and, if so, places all print jobs on hold and prints an instruction sheet listing a series of setup operations to be performed by the operator. The operator then performs the setup operations listed on the printed instruction sheet and, when setup is completed, the operator enters a code that removes the hold, allowing the print jobs to proceed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic representation of a printing system with attached finishing devices.

FIG. 2 is block diagram illustrating the architecture of a typical print system employing the present invention.

FIG. 3 is a flow diagram illustrating the operation of a typical print system employing the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS AND PREFERRED EMBODIMENTS

Referring to Figs. 1 & 2, a typical print system **10** of the type employing the present invention includes a printer **20** having a printer user interface **22** and a top exit copy tray **24**. While the exemplary print system **10** shown is a network printing system configured to receive remote input through a network connection, other configurations are contemplated and possible within the scope of the present invention For example, the printing system could be a stand alone printer, including a scanner for on-site image input. While a particular printer configuration is discussed herein, it is to be understood that the present invention may be incorporated in other printing system configurations.

The printer **20** includes a raster image processor **26** that receives incoming data from a network **28** to which the printer **20** is connected. Prior to being transferred to the raster image processor **26**, the print job may be held in a print server queue **27** on the network **28**. The raster image processor **26** includes processing unit **30**, that receives control commands and data from the network **28**. Control commands are translated into machine control language by the processing unit **30**, while incoming print jobs and program codes are stored in a print job buffer **32**, also referred to herein as the RIP queue.

The printer **20** also includes a marking engine **40**, that incorporates standard paper handling and processing equipment necessary, for example, for producing images on output paper. The marking engine **40** receives and stores in a multiple page image buffer **23**, a data stream, including image data and control data generated by the processing unit **30**. The image data is processed and transmitted to a write head (not shown) for transfer to the output pages.

~~The marking engine **40** also includes output devices that transfer the printed out~~ pages to one or more finishing devices **42** ~~connected to~~ the printer **20** by a simple electrical connection **12**. ~~The~~ finishing device **42** includes a finishing device user interface ~~**43**~~. The finishing device **42** may be any commonly used finishing device, such ~~as a hole punch or binder.~~

~~The printer **20** includes a logic control center **50**, including a printer user interface~~ **22**, through which the ~~operator inputs~~ functions and receives messages from the printer ~~**20**. The printer **20** also includes a database **60** of shared instructions, stored on a local~~

disk, accessed by the RIP. The instructions stored in the database include, for example, setup instructions for a particular finishing device that are to be followed by the operator in all cases, regardless of the particular configuration chosen. Generally, these instructions will include directions as to how to physically set up a given finishing device. For example, a hole punch may have detents that must be physically moved to a desired position, but are secured by spring-loaded pins that must be removed prior to moving the detents. Likewise, the shared instructions may remind the operator to power down a particular finishing device prior to performing setup operations thereon, should that step be necessary.

Furthermore, because the shared instructions are stored on a local disk, the end-user may alter the shared instructions stored thereon to suit the end-user's individual needs. Typically, the database will include one file for each commonly encountered finishing device, in as many different languages, *i.e.*, English, French, Spanish, etc., as desired, a separate file for each such language. In practice, when the job submitter includes text in the instruction field of the job entry menu on the network, this text directs the RIP to retrieve the file for the appropriate finishing device identified in the instructions. The RIP retrieves and reads the disk file in the appropriate language for the selected finishing device, translates the file into a page description file that is rasterized and incorporated into the user instructions that are printed as the instruction sheet.

A preferred embodiment of the method of the present invention is demonstrated by the flowchart depicted in Fig. 3. The method includes receiving a print job from the network at Step **100**. Step **102** inquires whether the job specifies a third-party finishing device, such as a hole punch or perfect binder. If the response to Step **102** is negative, Step **104** inquires whether there are special instructions specified for the print job. If the response to Step **104** is negative, the print job is allowed to continue to Step **105** in which the print job is transferred to the marking engine and allowed to continue to completion, Step **105**. If, however, the response to Step **104** is affirmative, the instructions are printed in Step **106**, and the message "Holding for Instructions" is displayed on the printer user interface in Step **108**. Step **110** is an inquiry to determine whether the instructions have been printed, and if a negative response is received, Step **110** is repeated until an affirmative response is received. When an affirmative response is received to Step **110**,

Step **112** displays the message "Resume Job When Ready" on the printer user interface, followed by Step **114**, in inquiry as to whether the job has been resumed. When a negative response is received to Step **114**, Step **114** is repeated until an affirmative response is received. When an affirmative response to Step **114** is received, the message "Resumed" is displayed on the printer user interface, and the print job is passed to the marking engine and allowed to continue to completion.

When the response to Step **102** is affirmative, Step **118** inquires whether the job includes operator instructions. If the response to Step **118** is negative, Step **120** inquires whether there is a system "hold" for a third-party finishing device. If the response to Step **120** is affirmative, step **122** displays a "System Hold" message on the printer user interface, and Step **120** is repeated until a negative response is received. When a negative response to Step **120** is received, Step **124** displays a "Ready to Print" message on the printer user interface and the print job is passed to the marking engine and allowed to continue to completion Step **125**.

When the response to Step **118** is affirmative, Step **126** inquires whether there is a system hold for a third-party finishing device. If the response to Step **126** is affirmative, Step **128** displays a "System Hold" message on the printer user interface and repeats Step **126** until a negative response is received. When a negative response to Step **126** is received, Step **130** initiates a "system hold" for all print jobs that specify the particular third party finishing device referenced in Step **102** and prints an instruction sheet, listing the instructions entered by the job submitter in entering the job on the network, to the top exit tray. Step **132** displays a "Holding for Instructions" message on the printer user interface, and Step **134** inquires whether the instruction sheet has been printed. If the response to Step **134** is negative, Step **134** is repeated until an affirmative response is received, whereupon Step **136** displays a "Resume When Third-Party Finisher is Fully Setup" message on the printer user interface. Step **138** inquires whether the job has been resumed and, in the case of a negative response, is repeated until an affirmative response is received. When an affirmative response is received to Step **138**, Step **140** displays a "Resumed" message on the printer user interface and Step **142** removes the "system hold" for jobs using the finishing device specified in Step **102**, the print job is transferred to the marking engine and the job is allowed to continue to completion, Step **143**.

When a print job is transferred from the print server queue **27** to the RIP queue **32**, if the print job submitter has not entered any text in the instruction field of the job setup menu on the network **28**, the RIP **26** sends the print job to the marking engine **40** and the print job is finished. In one embodiment of the invention, when the RIP **26** detects any text in the instructions field, the RIP **26** prints the instruction sheet to the top exit tray **24** according to the operator message and then places the printer **20** in a "system hold" state, automatically holding all incoming print jobs either in the print server queue **27** or in the RIP queue **32**. Thus the print system **10** automatically prints the instruction sheet and enters a hold state, without operator intervention, and remains in this state indefinitely until the operator releases the print job, presumably after making the necessary finishing device setup operations.

In an alternative embodiment, the RIP **26** causes the marking engine **40** to print the instruction sheet and causes the print system **10** to enter a hold state only if the instructions include a finishing device **42** selection. If no finishing device **42** is selected, the print job continues to completion without system interruption.

After the instruction sheet is printed and the system **10** enters the "system hold" state, the operator removes the printed instruction sheet from the top exit tray **24** and carries the instruction sheet to the finishing device **42** for reference purposes during set up of the finishing device **42**. By carrying the printed instruction sheet to the finishing device **42**, the operator is able to refer to the instruction sheet while performing the necessary setup operations at the remote finishing device **42**, obviating the need for the operator to remember the instructions and enabling the operator to re-check the settings without walking back to the printer user interface **22**. Once the setup instructions are entered on the finishing device user interface **33** or the physical setup operations are performed on the finishing device **42** and rechecked, if necessary, the operator returns to the printer user interface **22** and releases the print job by entering a release code, such as by touching an appropriate region of a touch screen on the printer user interface **22** or by clicking a mouse on a computer screen of the printer user interface **22**. Once the job is released, the RIP **26** sends the print job to the marking engine **40** and the print job is completed.

It is to be understood that the foregoing detailed description describes presently preferred embodiments of the invention and that other alternatives, which will become apparent to those of skill in the art upon reviewing the foregoing description, are likewise intended to fall within the scope of the appended claims, including equivalents thereto.